

## REMARKS

Claims 11-18 which are directed to a non-elected embodiment of the present invention have been cancelled without prejudice.

Claim 19 has been amended to recite the basis for each of the weight percentages recited for components (2)(E) and (2)(F).

Each of Claims 1, 2, 6, 7 and 19 has also been amended to delete "from" from the expression "comprising from" and to insert "from" before each of the specified ranges in an effort to place those claims in better form.

Each of Claims 1, 2, 6, 7 and 19 has further been amended to replace the expression "'higher functionality" with "having an isocyanate functionality greater than 2" in the description of component B(1). This amendment makes it clear that in addition to the enumerated isomers of diphenylmethane diisocyanate (MDI) each of which has an isocyanate functionality of 2, other materials in the diphenylmethane diisocyanate series having higher isocyanate functionalities, i.e., isocyanate functionalities greater than 2 may be included in component (B) as B(1).

I. Claims 1-10 and 19 stand rejected under 35 U.S.C. §112, first paragraph, as failing to comply with the enablement requirement on the basis that the claims contain subject matter which was not described in the specification in such a way as to enable one skilled in the art to make and/or use the invention. The specific basis for this rejection is that Applicants have not specified the type of molecular weight for component (C) or the means by which it is has been determined.

Applicants respectfully traverse this rejection.

It is well established that an Applicant need not include in his/her disclosure information which is well known to those skilled in the art. In re Moore and Janoski, 169 USPQ 236 (CCPA 1971).

Those skilled in the art of polyurethane chemistry know how to determine the molecular weight of polyols. This is evident from the prior art of record in this case. See, for example, column 10 in each of U.S. Patents 4,326,043 and 4,359,541 in which molecular weights for the polyols employed in the examples are reported without any indication of the method used to determine that molecular weight. See

also, column 3, lines 48-49 of U.S. Patent 4,379,905 (molecular weights of 282-3,000); column 10 of U.S. Patent 5,102,918 (molecular weight of polyol not less than 200); page 1 of British Patent Specification 1,337,659 (molecular weight of 1,500 to 10,000); column 7, lines 14-37 of U.S. Patent 6,028,158 (molecular weight of about 100 to 10,000); column 7, lines 25-48 of U.S. Patent 6,063,891 (molecular weight of from about 76 up to about 10,000); and column 7, lines 35-59 of U.S. Patent 6,515,125 (molecular weight of from about 76 up to about 10,000) in which no method for determining the recited molecular weight ranges is specified.

It is clear from disclosures such as those listed in the previous paragraph that one skilled in the art of polyurethane chemistry would be able to determine the molecular weight of a hydroxyl compound without being told what method to use.

One skilled in the art of polyurethane chemistry reading Applicants' specification and claims would therefore be able to make and/or use the claimed invention.

Applicants' claims do therefore satisfy the enablement requirement of 35 U.S.C. §112, first paragraph.

Withdrawal of this rejection is therefore requested.

II. Claims 1-10 and 19 further stand rejected under 35 U.S. C. §112, second paragraph as being indefinite for failing to particularly point out and distinctly claim the subject matter which Applicant regards as the invention. Four specific bases for this rejection were given.

Applicants have amended their claims in a manner which is believed to remove three of the bases for this rejection. Applicants respectfully traverse the fourth basis for this rejection.

A. The first basis for this rejection is that it is unclear what constitutes "higher functionality polyisocyanates of the diphenylmethane series".

Each of Claims 1, 2, 6, 7 and 19 has been amended to recite that component (B)(1) has an isocyanate functionality greater than 2.

It is believed that this amendment removes this basis for this rejection with respect to Claims 1, 2, 6, 7 and 19 and Claims 3-5 and 8-10 which depend therefrom.

Withdrawal of this rejection is therefore requested.

B. The second basis for this rejection is that it is unclear with respect to Claim 19, within sections (2)(E) and (2)(F), how to interpret the language "comprised from".

Applicants have amended Claim 19, sections (2)(E) and (2)(F) to delete the expression "comprised from" and to replace "comprised" with "comprising" and to insert "from" before each of the enumerated materials.

It is believed that these amendments remove this basis for this rejection.

Withdrawal of this rejection is therefore requested.

C. The third basis for this rejection is that in the absence of basis, it cannot be determined how to interpret the percentages recited in Claim 19, sections (2)(E) and (2)(F).

Applicants have amended Claim 19 to recite the basis for each of the percentages recited in sections (2)(E) and (2)(F).

It is believed that this amendment removes this basis for this rejection.

Withdrawal of this rejection is therefore requested.

D. The fourth basis for this rejection is that it is unclear how the allophanation reaction proceeds in absence of an allophanation catalyst.

No catalyst is needed for the allophanation reaction to occur. See, for example, the enclosed copy of page 90 taken from Oertel's Polyurethane Handbook, 2nd Edition where it is taught that the formation of allophanates can be carried out "uncatalyzed" at temperatures of from about 120 to 140°C.

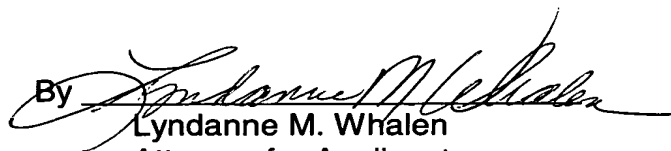
Applicants' claims in which use of an allophanation catalyst is optional do therefore satisfy the definiteness requirement of 35 U.S.C. §112, second paragraph.

Withdrawal of this basis for this rejection is therefore requested.

Applicants note with appreciation the Examiner's indication that the present invention is deemed to be allowable over the prior art.

In view of the above amendments and remarks, reconsideration and allowance of Claims 1-10 and 19 are respectfully requested.

Respectfully submitted,

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# Polyurethane Handbook

Chemistry – Raw Materials – Processing  
Application – Properties

Edited by Günter Oertel

2nd Edition

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ing ranges. For example, polycarbodiimide films of 4,4'-diisocyanato-diphenylmethane (MDI) melt at approximately 280°C, and polycarbodiimide films of 1,5-diisocyanatonaphthalene (NDI) at temperatures above 350°C [25].

Depending on the catalyst used, carbodiimide formation can compete strongly with isocyanurate formation. Both groups are frequently present in the reaction products. Because of the carbon dioxide generation, carbodiimidization can be used directly in the production of foams, but only indirectly, via separately produced intermediate steps, in the production of elastomers.

One such intermediate product of commercial importance is obtained from monomeric MDI by conversion of a small part of the isocyanate groups to carbodiimides (see Table 3.7). In this process, uretonimine groups also result by cycloaddition of isocyanate with already formed carbodiimide groups (see formula in subsection 3.2.1). Carbodiimides react with water to form ureas. One of several commercial uses of polyisocyanates that have been partially converted to carbodiimides is the production of elastic, semirigid PU foams.

### 3.3.2.3 Polyisocyanates with Allophanate, Urea, and Biuret Groups

Partial reaction of polyisocyanates with multifunctional hydroxyl or amine components to combine molecular weight increase with certain chemical structure and terminal isocyanate groups is a method that has long been known in principle [1, 6, 7] (see formulas in subsections 2.1 and 3.2.1). Because of their polar groups, polyisocyanates modified in this manner often mix particularly well with polyethers. Their usefulness has been proven in production of ambient curing, highly elastic foams and integral foam systems [31]. The group of polyisocyanates modified with polyethers or polyesters is classified as prepolymers and will be discussed in the following paragraph.

The differing thermal stabilities of the various bonds are technically important. They can be classified as follows:



The polyisocyanates used also affect thermal stability. For example, bonds based on aliphatic isocyanates are more thermally stable than those based on aromatic products [32].

#### *Allophanate-Modified Polyisocyanates*

In the urethane group, a slightly acidic hydrogen atom is attached to the nitrogen. It is able to react with isocyanates under more energetic conditions. In this reaction a substituted allophanate group is formed with corresponding branching. This reaction can be carried out uncatalyzed at about 120 to 140°C. Because of the many side reactions that occur at these temperatures, catalysts are used in the production process. Strong bases, tertiary amines, and metallic compounds, such as zinc acetylacetonate, are used as catalysts. The catalysts make it possible to lower the reaction temperature to about 100°C. High reaction velocities with a minimum of side reactions can be achieved through exact temperature control. Side reactions, particularly trimerization, can also be suppressed by addition of p-toluenesulfonic acid methyl ester. Starting substances are usually low molecular weight reaction products of diisocyanates and diols. In the first step, these are converted at a ratio of 2:1, which results in a diisocyanato-diurethane. By reaction with two additional diisocyanate molecules, a tetra-isocyanato-diallophanate is formed as the main product in the second step:

